BOOK REVIEWS

Men of Physics—L. D. Landau : Volume 2: Thermodynamics, Plasma Physics and Quantum Mechanics

D. Ter Haar, Pergamon Press, 1969. Pp 198.

The motivation of these two paper back volumes on Late Professor L. D. Landau, we are told, was "to make the undergraduates familiar with at least some of Landau's works, apart from his text books" and for this purpose the first volume presented eight papers and in this second volume there are ten papers on such varied topics as second order phase transitions, the origin of stellar energy, the multiple production of particles during collision of fast particles ; as also, there are papers on more sophisticated topics like conservation laws for weak interactions. The volume is provided with an introduction by Ter Haar, which seeks to clarify the background of the works, the exact nature of the contribution made by Landau and some sort of evaluation of those contributions in the light of later researches. While the reviewer finds the volume quite interesting, he is afraid that it is too high not only for the average undergraduate but even for the more meritorious among them The book would be of special value to those who are interested in the history of development of science.

A. K. R. C.

Topics in Nonlinear Physics—Proceedings of the Physics Session

International School of Nonlinear Mathematics of Physics A Nato Advanced Study Institute Max Planck Institute for Physics and Astrophysics, (Munich, 1960) Ed. Norman J. Zabusky, Springer—Verlag. 1968.

The Physics Session, of which the present volume gives the proceedings, ran for three weeks The scope of the school was to survey nonlinear phenomena in different fields of physics and to look for similar concepts and techniques that may be applicable to more than one branch. The opening lecture was a perspective one by Heisenberg entitled 'Nonlinear Problems in Physics' Heisenberg pointed out that practically every classical problem in Physics involves nonlinear mathematics and it may well be that in the final form quantum theory will also be a nonlinear one. Taking as an example the calculation of the motion of a proton in a proton synchrotron, Heisenberg expresses the suspicion that "nonlinear problems have a certain kind of unpredictability" The way out of this difficulty created by 'Unpredictability' may be to study ensembles of solutions rather than single solutions as is the approach in statistical mechanics

The following six lectures are on such an advanced level and are on so varied topics that the reviewer finds no other alternative than simply noting their titles and authors : (1) The nonlinear field theories in mechanics by Truesdell giving an axiomatic development of the mechanics and thermodynamics of macroscopic classical non-relativistic continua (2) Introduction to nonequilibrium statistical mechanics by Prigogine (3) Interactions in a classical relativistic plasma by Baus (4) Nonlinear optics by Bloembergen (5) Lectures on homogeneous turbulence by Saffman and lastly (6) Superspace and the nature of quantum geometrodynamics by Wheeler.

The book thus covers a very wide field of advanced classical physics and would undoubtedly be a welcome addition to any library interested in advanced mathematical physics.

A. K. R. C.

Conference Booklet: High Magnetic Fields and their Applications (Nottingham, 1969)

The Institute of Physics & The Physical Society,
47, Belgrave Sq., London SW 1.
167 pages. 30sh (3.60 dollars)

The booklet is a collection of 30 papers presented at the fourth International Conference on High Magnetic Fields and their Applications held at the University of Nottingham from 17 to 19 September, 1969. The papers, though concise, are successful in indicating the 'wealth and variety' of new problems that are now attacked due to the ready availability of high magnetic fields Most of the papers appear in a short frorm, but there are some review papers summarising the recent works accomplished in some well-known laboratories. Eight of the papers deal with the production of high fields utilising Bitter-type magnet and/or superconducting magnet and/or short-duration pulsed magnet, one paper discusses 'embryonic' technological applications to mining, metallurgy and medicine; the rest are devoted mainly to the investigation of electronic and magnetic structure of solids. The papers deal with the band-structure of semi-conductors, semi-metals and metals; electrons, holes, excitons and polarons in crystals; magnetic ordering and phase transitions with reference to exchange interactions between ions in solids; magnetoplasma-phonon interaction; conformations of molecules as revealed by high-field N.M R etc. The physical properties of solids studied at high field are (1) reflection and absorption of radiation in UV, visible and infrared region (2) cyclotron resonance (3) antiferromagnetic resonance (4) N.M.R. (5) ultrasonic attenuation (6) laser emission and Raman scattering (7) photo-conductivity (8) oscillatory magnetoresistance and (9) magnetic susceptibility.

The booklet will be a good addition to any Solid State Physics Research Laboratory.

M. C.

Current Algebra and Phenomenological Lagrange Function.

Springer Tract in Modern Physics. Ergebnisse der exakten Naturwissenschaften50
Springer-Verlag, Berlin. Heidelberg. New York 1969.

The book is a collection of invited papers at the first summer school for Theoretical Physics, University of Karlsruhe (July 22-August 2, 1968). It contains the following articles: 1) Dynamical Groups and their Currents. A Model for Strong Interactions—A. O. Barut. It is a discussion on the differences between the group structure of the multiplets and the group structure of interactions and a review of the general framework of the dynamical group, its special form in cases of the Dirac particle and the H-atom and its application to hadrons. (2) Current Algebra and Light Charges—H Leutwyler. Starting with a brief review of the basic assumptions involved in current algebra it dwells on the properties of lightlike charges. (3) Introduction to the Lagrangian Method—Volkhard F Muller. It provides an elementary introduction to the Lagrangian formalism of classical field theory. (4) Introduction to the Method of Current Algebra—H. Pietschmann The author demonstrates the power of current algebra on two examples, namely the Adler-Weisberger relation and the Mathur-Okubo-Pandit-Callan-Treiman relation. (5) S-Matrix Formulation of Current Algebra—H. Pilkhun. (6) Electromagnetic Mass Difference - J Rothleitner. It deals on the shift of the energy levels of strongly interacting systems caused by the electromagnetic interaction. (7) Non-leptonic Decays and Mass Differences of Hadrons - B. Stech. The subsequent three articles (8) Current Algebra in the Framework of General Quantum Field Theory, (9) Current Algebra and Renormalizable Field Theories, (10) Introduction to Current Algebra, are by P. Stichel. Starting with a rigorous definition of Equal-Time Commutator, the author investigates the Vacuum-Expectation-value of current commutators and Equal-Time-Commutation Relation in perturbation Theory. The last one is a short review of the content of Current Algebra. (11) Realisation of a Compact, connected, semi-simple Lie Group-Julius Wess. This is a comprehensive discussion on the topic. (12) Problems in Vector Meson Theories—W. Zimmermann. The author discusses the model of a massive vector field coupled to a conserved current and models of two vector fields which are coupled to the same current.

N. D. S. G.